

**PATENT**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Application No.: 10/674,930  
Filing Date: September 30, 2003  
Applicant: Terry L. Schneider  
Group Art Unit: 1794  
Examiner: Brett Alan Crouse  
Title: POLYMER COMPOSITE STRUCTURE REINFORCED  
WITH SHAPE MEMORY ALLOY AND METHOD OF  
MANUFACTURING SAME  
Attorney Docket: 7784-000553/US/CPB

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Mail Stop AF  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, Virginia 22313-1450

**LETTER**

Dear Sirs:

Pursuant to our telephone conversation with Examiner Brett A. Crouse regarding the "Notice of Panel Decision from Pre-Appeal Brief Review" mailed September 17, 2008, advising that a conference would not be held because Applicant concurrently filed a Terminal Disclaimer with the Pre-Appeal Brief Request for Review, it is the undersigned's understanding that the Terminal Disclaimer has in fact been entered. Pursuant to the recommendation of Examiner Crouse, the Applicant is resubmitting the Pre-Appeal Brief Request for Review along with the Pre-Appeal Statement for the Panel's review and

consideration. A copy of the Pre-Appeal Brief Request for Review and Pre-Appeal Statement previously filed on September 3, 2008 are attached hereto for consideration.

Applicant believes that no fee is required with this filing. If, however, the Office believes that a fee is required, please charge our deposit account 08-0750 for any fee that may be due.

Please contact the undersigned if there are any questions regarding this matter.

Respectfully submitted,

Dated: Oct. 3, 2008

By:   
Mark D. Elchuk, Reg. No. 33,686

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**PRE-APPEAL BRIEF REQUEST FOR REVIEW**Docket Number (Optional)  
7784-000553/US/CPB

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to "Mail Stop AF, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450" [37 CFR 1.8(a)]

Application Number  
10/674,930Filed  
September 30, 2003First Named Inventor  
Terry L. SchneiderOn Not ApplicableArt Unit  
1794Examiner  
Brett Alan Crouse

Signature \_\_\_\_\_

Typed or printed name \_\_\_\_\_

Applicant requests review of the final rejection in the above-identified application. No amendments are being filed with this request.

This request is being filed with a notice of appeal.

The review is requested for the reason(s) stated on the attached sheet(s).

Note: No more than five (5) pages may be provided.

I am the

☐ applicant/inventor☐ assignee of record of the entire interest.  
See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96)☒ attorney or agent of record.  
Registration number 33,686.☐ attorney or agent acting under 37 CFR 1.34.  
Registration number if acting under 37 CFR 1.34 \_\_\_\_\_

Signature

Mark D. Elchuk  
Typed or printed name(248) 641-1600  
Telephone number

Date

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below\*.

☐ \*Total of \_\_\_\_\_ forms are submitted.

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Alexandria, Virginia 22313-1450

**PRE-APPEAL STATEMENT**

Sir:

The present Pre-Appeal Statement is being submitted pursuant to the Final Office Action June 3, 2008. All of the pending claims 1-9, 11-21 and 24-36 stand finally rejected.

**Subject Matter of Application**

The present disclosure is directed to a polymer composite structure having an interlayer which is reinforced with shape memory alloy (SMA) particles. The use of SMA particles in the interlayer significantly enhances the damage resistance and damage tolerance (e.g. compression-after-impact (CAI) strength) of the interlayer without negatively affecting its hot-wet compression strength. The polymer composite structure may comprise titanium-nickel alloy particles, and more preferably particles

formed from NITINOL® alloy. The titanium-nickel alloy particles have superelastic, reversible strain properties similar to elastomeric or polymeric thermoplastic particles more traditionally utilized in the interlayer of a polymer composite structure, but do not negatively affect the hot-wet compression strength of the interlayer. The result is a polymer composite material having an interlayer which is able to even more effectively absorb impact stresses, thereby toughening the composite material, without negatively affecting its hot-wet compression strength.

#### **Rejection Under 35 U.S.C. §103(a)**

Claims 1-9, 11-21 and 24-36 were finally rejected as being unpatentable over Terasaka et al. in view of Herkules, and further in view of Yliopisto. Independent claims 1, 14 and 26 have been amended to highlight that the stress induced phase change property of the SMA particles is used to enhance the compression-after-impact strength of the underlying protective coating or paint. These independent claims were also amended to positively recite that the SMA particles (or nickel-titanium particles) are provided in their austenitic state. This feature is not shown or suggested by the Terasaka et al., Herkules and Yliopisto combination of references.

The Examiner is ignoring an important distinction between the teachings of Terasaka et al. and the Herkules and Yliopisto references. That distinction is that the functionality of the resin in Terasaka et al. would be destroyed if the general teachings of the Herkules and Yliopisto references were applied thereto. That is because Terasaka et al. requires the particles 44 to be in their martensitic state to enable them to be "crushed" or deformed initially in the fabrication process, for the particles to perform their needed function. For the Terasaka et al. resin to function as it is needed to, i.e., to expand in response to a thermal change in the resin, the particles absolutely need to be able to return to a spherical shape via the "shape memory effect" (temperature-induced martensite to austenite phase transformation). Put differently, when the resin in which the particles are encapsulated expands due to a change in humidity and/or temperature, which causes the connection terminals to be pushed upwardly in the drawing of Figure 4 of Terasaka et al., the particles need to be able to "decompress". By having the particles compressed into their martensitic state during

manufacture, this allows the particles 44 to expand in the thickness direction of the ACF when the resin heats up, thus maintaining electrical conductivity between the connection terminals (col. 3, lines 5-19). Thus, applying the general teachings of Herkules and Yliopisto as to stress induced phase change of the SMA particles (which the presently claimed resin relies on), to the resin of Terasaka et al., would provide no benefit to the resin in Terasaka et al., and furthermore would actually render the resin inoperable for its intended purpose. This is fundamentally different from the presently claimed protective coatings and paint, where the SMA particles need to be in their austenitic state when deployed in the protective coating or resin, and where the stress induced phase change property of the SMA particles is relied on to enhance the compression-after-impact strength of the coatings or paint.

Essentially what the Examiner has posited through the Terasaka et al., Herkules, and Yliopisto rejection is that because the general stress induced and temperature induced phase change properties of SMA particles are known, it would have been obvious to modify the resin of Terasaka et al. to make use of the stress induced phase change properties of SMA particles in a protective coating in which SMA particles are present. Again, using the teachings of the secondary and tertiary references to modify Terasaka et al. would have destroyed the utility of Terasaka. The Terasaka et al. resin would likely be entirely inoperable if the particles 44 were provided initially in their austenitic state. That is because the particles need to be able to thermally revert to their spherical configuration as the resin expands in order to perform their intended function of maintaining electrical conductivity between the connection terminals.

The Examiner has cited various paragraphs in Terasaka et al., principally in column 2, lines 65-67 and column 3, lines 1-10, to support an assertion that "stress induced" deformation is taught by Terasaka et al. However, this text merely underscores the fundamental difference between the presently claimed subject matter and that of Terasaka et al.: that the SMA particles are initially crushed by thermocompression, and therefore would not be able to provide any impact resistance to the resin in which they are suspended. This text further states that the SMA particles "remain in a compressed state due to stress acting thereon from the outside,

and only revert to their initial state due to a stress acting thereon from the outside" (that stress being a temperature related stress acting on the resin).

Furthermore, there is no suggestion in any of the cited references of actually using the stress induced phase change property of SMA particles to enhance compression-after-impact strength of a protective coating or paint. This significant benefit and advancement only becomes apparent after reviewing the Applicant's own disclosure. In view of the above, it should be clear that Terasaka et al. does not make use of a stress induced phase change of the materials to enhance a compression-after-impact strength of the underlying resin.

Claims 1-9, 11, 12, 14-21, 24, 26-33, 35 and 36 were also improperly rejected as being obvious over Yamakawa et al. (WO/03/102071; hereinafter "Yamakawa et al."). Yamakawa et al. is directed to a semiconductor that is manufactured in part with the use of a thermoconductive curable liquid polymer composition 5. The composition 5 is stated to function as a protective layer for the semiconductor element and as an adhesive agent for heat dissipation fins 6. The polymer 5 is stated to include a filler "B" made from a thermally elongatable shape memory alloy and a thermoconductive filler "C". The principal feature and function of the polymer is that it forms a good thermoconductive, curable liquid polymer with good flowability before curing, and good electrical conductivity after curing. Beyond a brief statement that the polymer 5 functions as a protective coating (which virtually any polymer coating would), there is no mention or suggestion that the polymer is able to provide any appreciable compression-after-impact strength, nor is being used for this purpose. Rather, it appears that just like with Terasaka et al., the SMA material is being used strictly to respond to temperature changes that the resin experiences and, in response to such temperature changes, to change shape to help maintain electrical conductivity between components that are covered by the resin. Thus, this reference, like Terasaka et al., only makes use of the thermal phase change property of the SMA particles.

**Provisional Double Patenting Rejection**

The Examiner rejected claims 1, 2, 5-8, 11-15, 18-24 and 27-29 on the ground of obviousness-type double patenting. A terminal disclaimer is being submitted concurrently with the present Pre-Appeal Statement that disclaims the terminal portion of co-pending U.S. application no. 10/674,615.

**Conclusion**

It is respectfully submitted that all of the rejections under 35 U.S.C. section 103 are improper and withdrawal of same is respectfully requested.

Respectfully submitted,

Dated: Sept. 3, 2008

By: Mark D. Elchuk  
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